

Lepidium ginninderrense (Brassicaceae), a new species from the Australian Capital Territory

N.H. Scarlett

Department of Botany, La Trobe University, Bundoora, 3086, Victoria, Australia

Abstract

A new species, *Lepidium ginninderrense*, is described. It is compared with *L. pseudopapillosum* Thell. and *L. monoplocooides* F. Muell., species to which it had previously been referred. It is assigned a risk code of 2E A 55, reflecting its small population which occurs at only one unreserved site. Some morphological characters of special interest are discussed and a key to the species in *Lepidium* sect. *Papillosa* is provided.

Introduction

In 1970 Burbidge and Gray published an English description of an apparently new species of *Lepidium* under the name '*L. aff. monoplocooides* F. Muell.' This was known from a single collection from the lower slopes of Mt Ainslie in the Reid area of Canberra in the Australian Capital Territory (A.C.T.) (*R.D. Hoogland 3085*, 20. xii. 1952, CANB 64913). In her revision of the genus *Lepidium* in Australia, Hewson (1982a) provisionally included the Hoogland collection within the circumscription of *L. pseudopapillosum* Thell., an extremely rare species from the Flinders Ranges of South Australia, the northern plains of Victoria and the unidentified type locality which is possibly in New South Wales.

In 1993 a population identical in diagnostic characters to the Hoogland collection was discovered on the floodplain of Ginninderra Creek in the Belconnen Naval Transmission Station, also in the A.C.T. (S. Sharp *in litt.* 1999). Plants grown from the seed of this population showed no evidence of hybrid origin. In view of this and the unique combination of characters shared by the two known populations, the taxon is here described as a new species in *Lepidium* sect. *Papillosa* Thell. *ex* Hewson.

Taxonomy

Lepidium ginninderrense N.H. Scarlett *sp. nov.*

affine *L. pseudopapilloso* Thell. sed ab combinatione characterum sequentium distinguitur: Planta graciliore. Caules leviter papillosae. Siliculae obtusi-obovatae, vesiculato-papillosae, non profunde emarginatae (incisura longitudinalinae ca. 1/10 siliculae), superne leviter concavae. Pedicelli fere glabri sed marginibus distincte papilloso. Nectaria lageniformia, nectaria mediana lateralibus longiora. Stylus ad alas adnatus, in fructu maturo ad apicem bifurcatus, lobi stylares stigma aequantibus vel brevioribus.

Typus: Australia. Australian Capital Territory: Belconnen Naval Station, NW corner. Grid ref.: 689661006, 35°13'S 149° 05'E, 579 m altitude, *I. Crawford 3347*, *J. Hewson* and *A. Rowell*, 17 .xi. 1995 (holotypus CBG 9517925, isotypus NSW).

Lepidium sp. aff. *monoplocooides* (*sphalm.*) F. Muell. (1855): Burbidge and Gray, Fl. Austral. Cap. Terr.: 186 (1970); *Lepidium pseudopapillosum sensu* Hewson, *Brunonia* 4: 272–273 (1982), Fl. Australia 8: 273 (1982); L. Retter and G.J. Harden in Harden, Fl. New South Wales 1: 469 (1990); T.J. Entwisle, in Walsh & Entwisle Fl. Victoria 3: 420 (1996) *pro minore parte, non* Thellung, Vierteljahrschr. Naturf. Ges. Zürich 61: 462–463 (1916) *sensu stricto*.

Small perennial herb, 10 cm to a maximum of c.20 cm high with one to c. six branched stems from the rootstock, stems striate and moderately papillose. *Leaves* rather thick and



Figure 1. Holotype collection of *L. ginninderrense*.

fleshy, glabrous and shiny on the upper (adaxial) surface. Rosette leaves widely spaced, linear to very narrow oblanceolate 15–55 mm long, 1.5–2.0 mm wide, entire or with 1–2 short lobes, \pm glabrous on both surfaces but with 1–3 papillae on the apex, tapering gradually to a petiole c. 1 mm wide, which is markedly stippled with purple and expanded into a partly stem-sheathing base. Lower cauline leaves broad-lanceolate in outline, 15–35 mm long, 15–20 mm wide, pinnatifid with 1–3 pairs of linear pinnae which are entire or with one tooth on the distal margin, the margins and lower (abaxial) surface sparsely papillose, particularly on the midrib. Upper cauline leaves linear-lanceolate, 7–25 mm long, 1–1.5 mm wide, entire or with 1 or 2 short, narrow lobes, the margins and lower surface sparsely papillose, particularly on the midrib. Petiole of all cauline leaves short to \pm absent, stippled with purple, the base scarcely expanded. *Inflorescence* an elongating raceme, finally from 5 cm to a maximum of c. 15 cm long. *Pedicels* erecto-patent, 2–3 mm long, c. 0.5 mm wide, flattened and glabrate except for the papillose margins which frequently also have one or a pair of cylindrical hairs to 1 mm long toward the base. *Flowers* small c. 1.5 mm long, 2 mm wide. *Sepals* c. 0.75 mm long, 0.5 mm wide, green with scarious margins, the adaxial exterior sepal with a conspicuous median patch of elongate papillae, the abaxial exterior sepal with only 1–3 papillae near the tip, the two interior sepals glabrous. *Petals* absent. *Stamens* 4, median, the filaments expanded into a cushion-like base. *Nectaries* 6, bottle-shaped, the two median nectaries c. 1/5 of the sepal length, the two lateral nectaries about half that length and much narrower. *Style* fused with the silicula-wings in the mature fruit, the short, free portion bifurcate at maturity, the lobes equal to or shorter than the included stigma. *Siliculae* bluntly obovate, 4–5 mm long, 3–3.5 mm broad, valves carinate in the proximal quarter and broadly winged distally, emarginate, vesiculate-papillose, reticulate and concave adaxially due to the incurved, obtuse wings which form a notch about 1/10 of the length of the silicula. Wing-margins sparsely papillose. *Seeds* orange, c. 1.5 mm long, 1 mm wide, obovoid and narrowly-margined; radicle incumbent (Figs 1, 2 & 3).

Distribution and conservation status: *Lepidium ginninderrense* is known only from the two cited localities in the A.C.T. It is remarkably disjunct from all other members of sect. *Papillosa* in south-eastern Australia, which are mainly confined to the inland plains west and north of the Eastern Highlands.

Lepidium ginninderrense is now known only from the type locality. It has not been rediscovered in the Reid area despite deliberate searches (M.Gray pers. comm.). The pop-

ulation at the type locality is currently c. 2000 plants, occupying an area of 90×30 metres (Avis 2000). Within this area, 100m^2 was fenced in 1995 to protect plants of *Lepidium ginninderrense* from grazing, mowing and vehicle traffic (S. Sharp *in litt.* 1997; pers. comm. 2000). In view of the small population which is confined to a single unreserved site, the appropriate risk-code is 2E A 55, using the system of Briggs and Leigh (1996). In Briggs and Leigh's publication, *L. pseudopapillosum*, which is listed as Vulnerable (3VCa SNAV) clearly includes *L. ginninderrense*, as the A.C.T. is included in its distribution. This is also true of the listing for that species in the ANZECC Threatened Australian Flora List (1999). The description of *L. ginninderrense* as a new species makes it necessary to revise the data on *L. pseudopapillosum* in these publications.



Figure 2. Siliculae of *L. ginninderrense* ($\times 10$) showing the vesiculate-papillose, reticulate surfaces, fused style and shallow notch (from Holotype, left hand plant).

Lepidium ginninderrense occupies sites subject to winter inundation. Many native plant species of such sites are threatened by trampling, continuous grazing by introduced herbivores and associated pasture development, e.g. *Lepidium aschersonii*, *L. monoplocoides*, *Cullen parvum*, *C. tenax* and *Euphrasia scabra* (I. Crawford *in litt.* 1999). If *L. ginninderrense* still occurs undetected at other localities, it is likely to be at risk at these also.

Notes on habitat and ecology: The climate of the Canberra area is continental, with hot summers and cold winters with frequent frosts. The mean annual rainfall is 632 mm, spread fairly evenly throughout the year (Gentilli 1971).

At the type locality, the species grows on the floodplain of Ginninderra Creek in native grassland dominated by *Anstrodaunthonia* spp. and *Bothriochloa macra*. Associated herbaceous species include *Plantago gaudichaudii*, *Juncus filicanlis*, *Triptilodiscus pygmaeus*, **Parentinella latifolia* and *Calocephalus citreus*. The soil is a brown clay loam developed on Quaternary alluvium (I. Crawford *in sched.* 1995). Avis has shown that *L. ginninderrense* grows in areas with relatively low perennial grass cover often with indications of past soil disturbance (Avis 2000). The habitat at the Reid locality was rather similar: 'locally rather common, in depression with little vegetation in grassland' (R.H. Hoogland *in sched.* 1952), but no further details are known.

Etymology: The specific epithet refers to the type locality.

Other specimens examined: Australia, A.C.T., Canberra City Distr., Reid, ca. 600 m, R.D. Hoogland, 20.xii.1952 (CANB 64913). This specimen was collected from an area between the Canberra Institute of Technology and St. John's Church (M. Gray pers. comm. 13 May 1999 *teste* I. Crawford, *in litt.* 23 Oct. 1999).

Notes: *L. ginninderrense* is distinguished from *L. pseudopapillosum* by the vesiculate papillae on the face of the silicula, by the shallower silicula notch, by the silicula-wings being adnate to the style in the mature fruit, by the smaller and differently shaped nectaries, and by the bifurcate mature style. *L. monoplocoides* F. Muell. differs markedly from *L. ginninderrense* in the narrowly acute apex of the wings which form the silicula notch; however both species have an almost circumferential wing and a bifurcate style adnate to the wings in the mature fruit.

The silicula of *L. pseudopapillosum* is glabrous apart from very sparse papillae and/or acute hairs on the outer wing margins. Hewson's description of its silicula as 'glabrous to papillose' (Hewson 1982a and b) follows from her provisional inclusion of the Hoogland

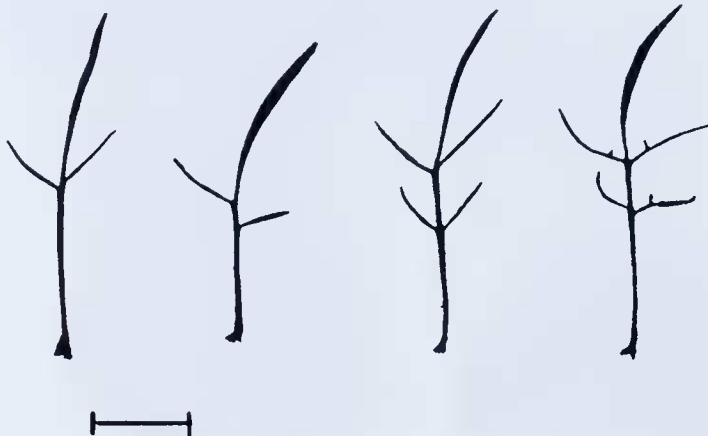


Figure 3. Lower cauline leaves of *L. ginninderrense*, from cultivated material grown from seed from the type locality (*ex* ANBG seedstore). Scale bar 10 mm.

collection within the circumscription of *L. pseudopapillosum*. The illustration in Hewson (1982a) is of *L. pseudopapillosum sensu stricto* as evidenced *inter alia* by the clearly glabrous silicula. Retter and Harden (1990) compound the potential confusion by describing the silicula of *L. pseudopapillosum* as ‘papillose, usually glabrous’, while the illustration of the silicula is that of *L. ginninderrense* with vesicular papillae on the face of the valves, a short silicula-notch and the style fused to the wings. Entwisle (1996) describes the siliculae of *L. pseudopapillosum* as ‘without hairs’, but in an appended note he states that they are ‘glabrous or papillose’. However, the illustration of the silicula in this case is that of *L. pseudopapillosum sensu stricto*.

Lepidium ginninderrense is placed in sect. *Papillosa* Thell. ex Hewson as it has apetalous flowers with 4 stamens and \pm sessile stigmas. However, like *L. pseudopapillosum*, its rather thick, fleshy leaves and incurved, almost circumferential silicula-wings suggest a relationship to sect. *Monoploca* (Bunge) Prantl. (Thellung 1916). *Lepidium monoplocoides*, included in sect. *Papillosa* by Hewson (1982a), also has these ‘*Monoploca*-like’ characters, and was included by Thellung in his ‘*grex Monoplocoidea*’. Mueller clearly shared that opinion, as is indicated by the species’ name. *Lepidium monoplocoides* and *L. ginninderrense* both have bifurcate styles in the mature fruits, a character particularly noticeable in the former species where the style lobes often markedly exceed the stigma in the mature flower (Hewson 1982a). This character appears to be unknown in any other *Lepidium* species (Thellung 1906; Hitchcock 1945; Hewson 1982a). Furthermore, as Thellung (1906) points out for *L. monoplocoides*, the combination of apetalous flowers, reduced stamen number and silicula wings adnate to the style is also unique in the genus. Mummenhoff *et al.* (1995), adopting Hewson’s tentative evolutionary treatment, point out that the extra-Australian sections *Lepia* (Desv.) DC., *Lepiocardamon* Thell. and *Cardamon* DC. ‘seem to represent one evolutionary lineage, separated from the other sections by the style fused to the wing of the fruits’. The isolated occurrence of this character in two Australian species with reduced flowers is apparently anomalous, although a slight degree of fusion of the style with the silicula wings also occurs in one other Australian species, *L. leptopetalum* F. Muell. in sect. *Monoploca* (Thellung 1906). It is likely that style/wing fusion has evolved independently in Australia, but a more direct phylogenetic connection with the extra-Australian *Lepia-Lepiocardamon-Cardamon* lineage cannot be entirely discounted (see Mummenhoff *et al.* 1992; 1995). In any event, *L. ginninderrense* is of particular significance for further research on *Lepidium* phylogeny. Its conservation is of great importance as a consequence.

Key to *Lepidium ginninderrense* and allied species in sect. *Papillosa* (after Hewson 1982a and b).

- 1. Cauline leaves auriculate at the leaf insertion2
- 1. Cauline leaves not auriculate at the leaf insertion but sometimes with a winged petiole3
- 2. Stem with vesicular and papillose hairs.....*L. papillosum*
- 2. Stem with acicular hairs*L. oxytrichum*
- 3. Silicula less than 3 mm long.....*L. merrallii*
- 3. Silicula more than 3 mm long4
- 4. Silicula-wings narrow and acute at the apex.....*L. monoplocoides*
- 4. Silicula-wings broad and obtuse at the apex5
- 5. Silicula glabrous except for a few fine papillae or acute hairs on the outer margins of the wings; style free of the silicula-wings.....*L. pseudopapillosum*
- 5. Silicula vested with both papillate and vesicular hairs; style fused with the silicula-wings*L. ginninderrense*

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